REMARKS

Claims 20, 22-26, and 28-31 and 34-38 are all the claims pending in the application. Claims 34-38 are added, above. Claims 20, 22-26, and 28-31 stand rejected on prior art grounds. Applicants respectfully traverse these objections/rejections based on the following discussion.

I. The Prior Art Rejections

Claims 20, 22-26, and 28-31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yoshida et al. (U.S. Patent No. 6,111,305) hereinafter "Yoshida," in view of Bendernagel et al. (U.S. Patent No. 5,061,652) hereinafter "Bendernagel." Applicants respectfully traverse these rejections based on the following discussion.

A. The 35 U.S.C. §103(a) Rejection Based on Yoshida and Bendernagel

The claimed invention comprises a three-dimensional core that can have, for example, six main sides. The bottom side rests on an underlying substrate. The top side contains the circuitry to operate the diode and blocks light. Therefore, the remaining four vertical surfaces (the claimed light sensing sidewalls) are the surfaces where light is absorbed. This structure is shown in perspective view in Figure 13A and described beginning at paragraph 51 of Applicants' disclosure. For example, paragraph 53 explains that the inventive three-dimensional photodiode structure provides more surfaces (e.g., 4 vertical surfaces) and more angles for light to reflect within each pixel than does the conventional structure that includes only a horizontal light adsorption region.

The applied Yoshida reference includes only a horizontal light absorption region. Bendernagle is not involved with photosensor technology. The increased unit area associated with the vertical light sensing sidewalls of the claimed invention creates more electron and hole carriers. These carries are transferred more quickly to the respective junction area due to large surface area of the interface and the carrier transit distance being smaller than that of the conventional structure.

Each claimed core is surrounded by transparent material that allows light to reach the vertical light sensing sidewalls of the cube-shaped core structure. Applicants' Paragraph 49 and following explains that a transparent polymer 120,130 surrounds each of the cube-shaped core structures and allows light to reach the vertical light sensing sidewalls. To the contrary, as shown clearly and Figures 9 and 10 of Yoshida, the conventional structures only receive light along their horizontal surfaces. The p-i-n structure shown Figures 9 and 10 of Yoshida does not include any transparent regions within the structure. In Yoshida, material 4 is a p-type semiconductor, material 5 is an i-type semiconductor and material 6 is an n-type semiconductor. None of these regions are transparent (see column 10, lines 8-31 of Yoshida). Therefore, the structure shown in Yoshida can only receive light along in its upper horizontal surface. There is no light receiving vertical sidewall that is perpendicular to the light receiving regions in Yoshida.

Therefore, Yoshida does not teach or suggest the invention as defined by independent claims 20, 26, and 34 that define sidewalls that are "perpendicular to a surface of said photodiode that receives incident light" (claims 20 and 34) or are "perpendicular to surfaces of said photodiodes that receive incident light" (claim 26). Thus, Applicants respectfully submit that the structure defined by the independent claims is not anticipated or rendered obvious by Yoshida (with or without Bendernagel).

Bendernagel is not properly combinable with Yoshida because Bendernagel is not related to the art of photodetectors or photodiodes. To the contrary, Bendernagel only generally discusses the need to isolate adjacent transistors. There is no teaching or suggestion in either Yoshida or Bendernagel of using isolation regions in photodiodes.

Bendernagel is referenced for showing trenches filled with a transparent material. However, Bendernagel does not disclose the use of any transparent material. Bendernagel only discloses that transistors can be isolated from one another using isolation regions and does not disclose any use of transparent materials or that the transparent materials could be adjacent to vertical light sensing sidewalls as in the claimed invention. Therefore, even if Bendernagel were combined with Yoshida, the proposed combination still would not teach a transparent material adjacent the vertical light sensing sidewalls of the claimed invention.

Since Bendernagel does not teach or suggest the use of a transparent material, it cannot teach or suggest the claimed invention that includes transparent material in trenches that separate the inventive cores (that include light sensing vertical sidewalls). Therefore, independent claims 20, 26, and 34 are patentable over any combination of Yoshida and Bandernagel because such a combination does not teach or suggest the invention as defined by independent claims 20, 26, and 34 that define sidewalls that are "perpendicular to a surface of said photodiode that receives incident light" (claims 20 and 34) or are "perpendicular to surfaces of said photodiodes that receive incident light" (claim 26). Further, dependent claims 22-25, 28-31, and 35-38 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. In view the foregoing, the Examiner is respectfully requested to reconsider and withdraw these rejections.

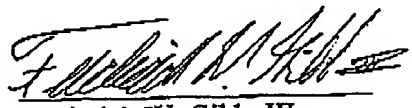
II. Formal Matters and Conclusion

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 50-0510.

Respectfully submitted,

Date: 7-25-05



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